Math 240 | Problem Set #15 Partitions | M. Flashman
Fall, 2006

1. Let S = $\mathbb{R}^2$ = {(*x*,*y*): *x*,*y* $\in\mathbb{R}$}.

   a. Let L_c = {(*x*,*y*) $\in \mathbb{R}^2$: x+ y = c}, and $\mathscr{F}$= {L_c :c $\in\mathbb{R}$}.Prove $\mathscr{F}$ is a partition of S.

   b. Suppose A , B and C be real numbers with $A^2 + B^2 \neq 0$.

   Let L(A,B,C) = {(*x*,*y*) $\in \mathbb{R}^2$: Ax+ By = C}. Let $\mathscr{F}$(A,B)= {L(A,B,C) : C $\in\mathbb{R}$}.

   Prove $\mathscr{F}$(A,B) is a partition of S.

   c. Let A = S-{(0,0)}.

   For (a,b) in A, let <a,b> = { (*x*,*y*) $\in$A: for some real number *t* , *x* = *t*a and *y* = *t* b}.

   Let $\mathscr{F}$= {<a,b>: (a,b) $\in$A}. Prove $\mathscr{F}$ is a partition of A.

2. Suppose *f* : $\mathbb{R}\to\mathbb{R}$ is an onto function. Let $\mathscr{F}$= { f^{-1} ({*a*}): *a* $\in\mathbb{R}$}. Prove $\mathscr{F}$ is a partition of $\mathbb{R}$.

3. Suppose *f* : A$\to$B is an onto function. Let $\mathscr{F}$= { f^{-1} ({*b*}): *b* $\in$B}. Prove $\mathscr{F}$ is a partition of B.

4. DS Problem 2.22